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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,838	02/02/2006	Daniele Pullini	463651	7477
23117 7590 08/28/2008 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203			EXAMINER VALENTINE, JAMI M	
			ART UNIT 2894	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/566,838	Applicant(s) PULLINI ET AL.
	Examiner JAMI M. VALENTINE	Art Unit 2894

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5/19/08.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-41 is/are pending in the application.
- 4a) Of the above claim(s) 24-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 February 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/02/06</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. **Claims 18-41** are pending in this application. Applicant's election without traverse of Group II (Claims 18-23) in the reply filed on 5/16/08 is acknowledged.
2. Newly submitted claims (claims 24-41) are drawn to the invention of Group I (see restriction requirement mailed 3/21/08) and are directed to an invention that is independent or distinct from the elected invention originally claimed for the following reasons:
3. The elected invention (Group II, claims 18-23) and the newly submitted invention (claims 24-41) do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The common concept linking together independent claims 18 and 24 is a magnetoresistive material of disordered mesoscopic structure comprising metallic nanoparticles in semiconducting or dielectric material. This concept is already known in the art. US 5, 462, 516 and EP 0,724,303, for example disclose magnetoresistive devices having nanometer sized metallic particles dispersed in a semiconductor or insulating matrix formed by usual deposition methods (e.g., sputtering, molecular beam epitaxy). These groups of claims have no common or corresponding special technical features and define two different prospective inventions not linked by a single general inventive concept. The application does not, therefore meet the requirement of unity of invention.
4. The elected invention and the newly submitted invention are related as product made and process of making. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or

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(2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process, such as, for example a process that does not include subjecting the substrate to a chemical etching process or forming pores. The elected invention contains "product-by-process" limitations. A "product by process" claim limitation is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17(footnote 3).

5. Accordingly, claims 24-41 are withdrawn from consideration as being directed to a non-elected invention. **Claims 24-41** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected inventions, there being no allowable generic or linking claim. The requirement is deemed proper and is therefore made FINAL. **Claims 18-23** are examined in this Office action.

US National Phase of PCT

6. Acknowledgment is made that this application is the US national phase of international application PCT/IB04/02543 filed 30 July 2004 which designated the U.S. and claims benefit of IT TO2003A000604 filed 5 August 2003, IT TO2003A000605 filed 5 August 2003, and IT TO2003A000727 filed 23 September 2003.

Foreign Priority

7. Acknowledgment is made that the certified copy of the foreign priority document has been received in the national stage application from the International Bureau.

Information Disclosure Statement

8. Acknowledgment is made that the information disclosure statement has been received

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and considered by the examiner. If the applicant is aware of any prior art or any other co-pending applications not already of record, he/she is reminded of his/her duty under 37 CFR 1.56 to disclose the same.

Drawings

9. The drawings are objected to because figures 1, 2C, 4A, 4B and 6 are informal. Specifically, the shading used in the figures makes it difficult to discern the features. This problem will be exacerbated in future reproductions. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

10. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The

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replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

11. The drawings are objected to under 37 CFR 1.83(a) because they fail to show a spin valve comprising a plurality of layers arranged in a stack which in turn comprises at least one free magnetic layer able to be associated to a temporary magnetization (MT), a spacer layer and a permanent magnetic layer associated to a permanent magnetization (MP), wherein said spacer element is obtained according to a method of manufacturing a magnetoresistive element comprising regions having metallic conduction and regions having semiconductive conduction wherein said method comprises the following operations: forming metallic nanoparticles to obtain said regions with metallic conduction; providing a semiconductor substrate ; applying said metallic nanoparticles to said semiconductor substrate to obtain a disordered mesoscopic structure as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the

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drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

12. The abstract of the disclosure is objected to because it has too many words. The abstract must contain 150 words or less. Correction is required. See MPEP § 608.01(b).

13. The disclosure is objected to because of the following informalities: repeated instances or designating different parts of the invention by the same reference character.

- 37 CFR 1.84(p)(4) states “the same part of an invention appearing in more than one view of the drawing must always be designated by the same reference character, and the same reference character must never be used to designate different parts.” The specification refers to “free magnetic layer 11” (page 7, lines 12-13 and page 8, line 28). The free magnetic layer was previously referred to using the reference character 111. Also, the reference character 11 was previously used to refer to the semiconductor substrate (page 2, line 9).
- The reference character 13 is used to refer to both “cylinders 13” (e.g. page 2, line 8) and “spacer layer 13” (e.g. page 8, line 18). This error appears multiple times. Appropriate correction is required.

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- The reference character 125 is used to refer to both “metallic matrix structure 125” (page 9 lines 33-34) and “matrix structure 125” (page 9 line 26). It is unclear whether or not the matrix structure is metallic.

Claim Rejections - 35 USC § 112

14. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

15. **Claims 21-23** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

16. **Claim 21** recites the limitation "said matrix". Claim 21 depends on claim 18, however, claim 18 does not include a matrix. There is insufficient antecedent basis for this limitation in the claim.

17. **Claims 22 and 23** recite the following indefinite language “wherein it is...” It is impossible to determine which element is meant by “it”. For the purposes of examination, “it” is taken to mean the spin valve.

Claim Rejections - 35 USC § 102

18. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

19. **Claims 18-23** are rejected under 35 U.S.C. 102(b) as being anticipated by Fujiwara et al. (US Patent Application Publication No 2002/0054461) hereinafter referred to as Fujiwara.

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20. Per **Claim 18** Fujiwara (e.g. figures 3a and 3b) discloses a magnetic device, comprising a spin valve, said spin valve comprising a plurality of layers arranged in a stack (e.g. figure 3a) including at least one free magnetic layer (31), a spacer element (33) and a permanent magnetic layer (32); wherein said spacer element includes a disordered mesoscopic structure which includes metallic nanoparticles (33a) applied to a semiconductor substrate (33b). [0021-0022]

21. Claim 18 includes "product-by-process" limitations. While product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Hirao*, 190 USPQ 15 at 17(footnote 3). The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) See also *in re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 116 *in re Wertheim*, 191 USPQ 90 (209 USPQ 254 does not deal with this issue); and *In re Marosi et al*, 218 USPQ 289 final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above case law makes clear.

22. Additionally, claim 18 recites the performance properties of the free magnetic layer (e.g. able to be associated to a temporary magnetization (MT); and the permanent magnetic layer (e.g. associated to a permanent magnetization (MP)). These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the

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prior art structure of Fujiwara. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997) See MPEP 2114. Additionally, these functional limitations are taught by Fujiwara in [0021].

23. Per **Claim 19**, Fujiwara discloses the device of claim 18, including where said spacer element (33) comprises a matrix (33b) and nanoparticles (33a). (see figures 3a-3b.)

24. Per **Claim 20**, Fujiwara discloses the device of claim 19, including where said matrix (135) is a matrix of dielectric material. [0022]

25. Insofar as definite, the claims are rejected in view of the existing prior art as follows: Per **Claim 21**, Fujiwara discloses the device of claim 18, including said spacer element (33) comprises a matrix (33b) and nanoparticles (33a); and said matrix (33b) comprises a porous dielectric material (aluminum oxide, see [0022]; porous, see figure 3b), and the nanoparticles (33a) are contained in pores of said porous dielectric material (see figure 3a-3b).

26. Insofar as definite, the claims are rejected in view of the existing prior art as follows: **Claim 22**, recites the intended use of the device. These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Fujiwara. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997) See MPEP 2114.

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27. Insofar as definite, the claims are rejected in view of the existing prior art as follows:

Claim 23, recites the intended use of the device. These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Fujiwara. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997) See MPEP 2114.

28. **Claims 18-23** are rejected under 35 U.S.C. 102(b) as being anticipated by S. Kumagai (US Patent No 6,103,406) hereinafter referred to as Kumagai.

29. Per **Claim 18** Kumagai (e.g. figure 4) discloses a magnetic device, comprising a plurality of layers arranged in a stack including at least one free magnetic layer (11), a spacer element (12) and a permanent magnetic layer (14); wherein said spacer element includes a disordered mesoscopic structure which includes metallic nanoparticles (7) applied to a semiconductor substrate (8).

30. While not explicitly stated, the fact that the device of Kumagai is a spin valve is inherent. Applicant's specification admits "In the sector of magnetic field sensors, magnetic devices are known which use the so-called 'spin valves'. A spin valve is a device generally constituted by a succession of layers of different materials." Additionally, a more conventional definition is provided by the teaching reference R. O'Handley, "Modern Magnetic Materials, Principles and Applications" Wiley and Sons, New York, 2000, page 594, which teaches that a spin valve has two magnetic layers separated by a nonmagnetic conductor, and the magnetic layers are uncoupled or weakly coupled, and one of the layers is magnetically soft and the other is

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magnetically hard, or pinned. Such is the case for the device of Kumagai and as such, this device is a spin valve.

31. Claim 18 includes "product-by-process" limitations. While product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Hirao*, 190 USPQ 15 at 17(footnote 3). The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) See also *in re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 116 *in re Wertheim*, 191 USPQ 90 (209 USPQ 254 does not deal with this issue); and *In re Marosi et al*, 218 USPQ 289 final product per se which must be determined in a "product by, all of" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "product by process" claims or not. Note that Applicant has the burden of proof in such cases, as the above case law makes clear.

32. Additionally, claim 18 recites the performance properties of the free magnetic layer (e.g. able to be associated to a temporary magnetization (MT); and the permanent magnetic layer (e.g. associated to a permanent magnetization (MP)). These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Kumagai. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d

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1429,1431-32 (Fed. Cir. 1997) See MPEP 2114. Additionally, these functional limitations are taught by Kumagai (column 7 lines 4-17)

33. Per **Claim 19**, Kumagai discloses the device of claim 18, including where said spacer element (12) comprises a matrix (8) and nanoparticles (7). (see figure 4).

34. Per **Claim 20**, Kumagai discloses the device of claim 19, including where said matrix (8) is a matrix of dielectric material. ((8) is Al_2O_3 , column 4 lines 12-15).

35. Insofar as definite, the claims are rejected in view of the existing prior art as follows: Per **Claim 21**, Kumagai discloses the device of claim 18, including said spacer element (12) comprises a matrix (8) and nanoparticles (7); and said matrix (8) comprises a porous dielectric material ((8) is Al_2O_3 , column 4 lines 12-15; porous, see figure 4), and the nanoparticles (7) are contained in pores of said porous dielectric material (see figure 4).

36. Insofar as definite, the claims are rejected in view of the existing prior art as follows: **Claim 22**, recites the intended use of the device. These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Kumagai. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d

1429,1431-32 (Fed. Cir. 1997) See MPEP 2114.

37. Insofar as definite, the claims are rejected in view of the existing prior art as follows: **Claim 23**, recites the intended use of the device. These functional limitations do not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Kumagai. While features of an apparatus may be recited either structurally

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or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997) See MPEP 2114.

Cited Prior Art

38. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Reference 1: R. O'Handley, "Modern Magnetic Materials, Principles and Applications" Wiley and Sons, New York, 2000, page 594.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMI M. VALENTINE whose telephone number is (571)272-9786. The examiner can normally be reached on Monday-Friday 9am-6pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kimberly Nguyen can be reached on (571) 272-2402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jami M Valentine, Ph.D./
Examiner
Art Unit 2894

/Kimberly D Nguyen/
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2894

/JMV/